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10/585,039	08/29/2006	Geoffrey Canright	OSL-037	6064

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EXAMINER	
NICKERSON, JEFFREY L	

ART UNIT	PAPER NUMBER
2442	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/585,039	CANRIGHT ET AL.	
	Examiner	Art Unit	
	JEFFREY NICKERSON	2442	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 July 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This communication is in response to Application No. 10/585,039 filed nationally on 29 August 2006 and internationally on 29 December 2004. The amendment presented on 31 July 2008, which provides change to claims1-2, 4, 7-8, and 10-15, is hereby acknowledged. Claims 1-15 have been examined.

Specification

2. The amendment presented on 31 July 2008 providing change to the abstract is noted. All outstanding objections to the specification are hereby withdrawn.

Claim Objections

3. The amendment presented on 31 July 2008 providing change to claims 2, 4, and 10-14 is noted. All outstanding objections to claims 2 and 4 are hereby withdrawn. The objections to claims 10-14 are hereby maintained.

Claims 10-14 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim, and 37 CFR 1.75, as being substantial duplicates of claim 1.

Claims 10-14 recite an intended use of their parent independent claim, claim 1. These claims do not recite an additional step or further refine the scope of a particular, pre-existing step as recited in the parent independent claim. Claims 10-14 contain material

that would be incorporated into the preamble of parent independent claim 1. MPEP 2111.02 (II) dictates that method claims containing limitations of intended use in the preamble do not patentably distinguish themselves from a method claim not containing the limitation, as both are capable of performing the intended use. For purposes of further examination these claims will be considered the equivalent of claims 1.

Claim Rejections - 35 USC § 112

4. The amendment presented on 31 July 2008 providing change to claims 7-8 is noted. All outstanding rejections under 35 USC 112 are therefore obviated and hereby withdrawn.

Response to Arguments

5. Applicant's arguments filed 31 July 2008 have been fully considered but they are not persuasive.

Independent claim 1

Applicant argues that Cheng ("Mean Shift, Mode Seeking, and Clustering"), would not be obvious to combine with the other cited references of claim 1 because Cheng does not discuss network theory and is therefore nonanalogous art. Applicant points out that Cheng discusses a generalized clustering of data points, which would not be obvious to apply to the clustering of network nodes because isolated data points do not interact with flow.

The examiner respectfully disagrees that Cheng is nonanalogous art. It has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Cheng teaches a method of clustering data, which is reasonably pertinent to various steps of applicant's claimed invention. To assume that all data clustering methods can not and should not be applied to network nodes is slightly ambitious. Clustering and grouping of network nodes based on various criteria is well known, as seen in Hanneman, chapter 8. Doing so using a known index, such as Eigenvector centrality, and a known mathematical method for grouping data is not out of the realm of obviousness. Furthermore, at the point in which applicant is performing the steepest ascent clustering (limitation 6), the links between the nodes are being used for an indication of geographical relation to other nodes. The flow/strength/interactiveness of the links has already been quantified and used to assign a weight value to the related node. Applicant has shifted these quantitative values of each link to that of the nodes, so that they may treat the nodes as data points and group accordingly.

Applicant further argues that the combined teachings of Girvan ("Community Structure in Social and Biological Networks"), Borgatti ("Centrality and Network Flow"), Cheng ("Mean Shift, Mode Seeking, and Clustering"), and Hanneman ("Introduction to Social

Network Methods") teach away from a limitation of claim 1, as amended. Specifically, applicant argues that the combined teachings teach away from using Eigenvector centrality in a network with undirected links.

The examiner respectfully disagrees. Hanneman teaches that network links may be undirected (Hanneman: pg 40). And, Hanneman provides that undirected network analysis is less complex than directed network analysis (Hanneman: pg 14, paragraph 2; pgs 40-41 "Connections" section). Multiple network analysis principles, such as closeness centrality, may be applied to networks that contain either undirected links or directed links (Hanneman: pg 65, last paragraph). Girvan specifically utilizes an algorithm for undirected networks (Girvan: pg 7825, "Food Web" paragraphs 1-2) and suggests that techniques from both the undirected and directed network worlds can be combined (Girvan: pg 7826, RHS, paragraph 2). And, perhaps most importantly, Borgatti provides that special care may need to be taken when implementing centrality measurements because of accuracy issues based on link/flow variations (Borgatti: abstract specifies off-the-shelf centrality measures are inaccurate when not in the particular link type environment they were designed from). Borgatti's awareness of the difficulties when applying particular centrality measurements to either undirected or directed networks proves that doing so has occurred, even if they aren't entirely reliable as he proves in his article, and would be obvious to try if not just to prove them inaccurate. Other motivations, of one of ordinary skill in the art at the time the invention was made, can be easily fabricated. For instance, one may be motivated to utilize a

directed link environment index in an undirected link environment in order to provide slightly inaccurate results. Therefore, using a known measurement index in a known network environment would not be non-obvious and the rejection of this claim is hereby maintained.

Dependent claims 2-15

Applicant argues these claims conditionally on the arguments of their parent independent claim 1.

The rejections of these claims are therefore maintained for reasons above.

Claim Rejections - 35 USC § 103

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

7. Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Girvan et al ("Community Structure in Social and Biological Networks", 11 June 2002), and in further view of Borgatti ("Centrality and Network Flow", 17 February 2002), Cheng ("Mean Shift, Mode Seeking, and Clustering", August 1995), and Hanneman ("Introduction to Social Network Methods", 2001).

Regarding claim 1, Girvan teaches a method for determining the ability of a network to spread information or physical traffic (Girvan: abstract), said network including a number of network nodes interconnected by undirected links (Girvan: abstract specifies connections between nodes; pg 7825, "Food Web" paragraphs 1-2), said method comprising the steps of:

mapping the topology of a network (Girvan: Figure 1; See also pg 7823, "Computer-Generated Graphs" section);

computing a value for link strength between the nodes (Girvan: pg 7821-7822, "Traditional methods" section specifies calculating weights for pairs of nodes, i.e. links; See also Figure 2)

identifying nodes which are local maxima of the weights as centre nodes (Girvan: pg 7822, "Edge 'Betweeness' and Community Structure" section, paragraph 2; See also pg 7824-7825, Figures 4, 5, and 6)

grouping the nodes into regions surrounding each identified center node (Girvan: abstract specifies splitting into communities; See also Figure 6)

assigning roles to nodes, wherein types of roles include center nodes, region member nodes, and border nodes (Girvan: pg 7822, "Edge 'Betweeness' and Community Structure" section; See also pg 7824-7825, Figures 4, 5, and 6),

measuring the susceptibility of the network to spreading (Girvan: pg 7825, "Collaboration Network" section).

Girvan does not teach computing an Eigenvector centrality index for the nodes based on link strength values and used to identify centre nodes, nor does Garvin teach

assigning roles of bridge nodes and dangler nodes and wherein the region members are assigned based on a steepest ascent link path terminating at a unique centre node in the topology map. Nor does Garvin teach measuring susceptibility of spread based on number of regions, the size of the regions, and how the regions are connected.

Borgatti, in a similar field of endeavor, teaches computing an Eigenvector centrality index for nodes based on link strength values and used to identify centre nodes (Borgatti: pg 56, introduction section; pg 61, paragraphs 3-4). Borgatti further teaches measuring susceptibility of spread based on number of regions, the size of the regions, and how the regions are connected (Borgatti: pg 62, paragraphs 3-4 specify infection is based on the eigenvector centrality, which takes all of these into consideration). Borgatti does not teach the roles of bridge nodes and dangler nodes, nor does Borgatti teach wherein the region members are assigned based on a steepest ascent link path terminating at a unique centre node in the topology map.

Cheng, in a similar field of endeavor, teaches creating groups (kernels/clusters) with data members based on the gradient ascent to the nearest maxima (Cheng: pg 790, introduction; pg 793, "convergence" section; pg 796, "Clustering as a natural process" section; See also Figure 4). Cheng does not teach assigning roles of bridge and dangling nodes.

Hanneman, in a similar field of endeavor, teaches role use such as bridges and sinks/dangling nodes (Hanneman: pg 77, paragraph 3 specifies bridges; pg 40, paragraph 2 for sinks).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the teachings of Borgatti for using an Eigenvector Centrality Index, the teachings of Cheng for clustering based on gradient ascent, and the teachings of Hanneman for analyzing social network roles. The teachings of Borgatti/Cheng/Hanneman, when implemented in the Girvan system, will allow one of ordinary skill in the art to calculate centrality using various measurements and assign typical roles based on characteristics of node associations, such as gradient ascent measurements. One of ordinary skill in the art would be motivated to utilize the teachings of Borgatti/Cheng/Hanneman in the Girvan system in order to analyze the social and connection interactions between network nodes with commonly accepted social networking principles (measuring centrality, using eigenvector centrality indexes, clustering based on gradient ascent, and assigning roles to network members based on their social connection characteristics).

Regarding claim 2, the Girvan/Borgatti/Cheng/Hanneman method teaches wherein computing said link strength value further comprises counting a number of different types of communication variations any pair of nodes uses in their interaction and using the number of communication variations as a measure for link strength (Borgatti: pg 56, "Typology of flow processes" section describes all the various types of relationship types; pg 59, "Relation to centrality measures" section describes how these communication variations affect link strength/centrality).

Regarding claim 3, the Girvan/Borgatti/Cheng/Hanneman method teaches wherein computing said link strength value further comprises measuring the traffic between any two nodes and using the measure of traffic as a measure for link strength. (Borgatti: pg 60, last paragraph specifies traffic volume is used to measure link strength/betweeness)

Regarding claim 4, the Girvan/Borgatti/Cheng/Hanneman method teaches computing link strength using various formulas and variables, including, but not limited to, communication type (Borgatti: pg 59, table 1 lists the communication types; Borgatti: pg 59, section "Relation to centrality measures" details how communication types, traffic volume, and "distance" affect centrality; See pg 60 for formula calculating betweeness; Hanneman: pg 67, paragraph 2 specifies that the betweeness measurement can be normalized as a percentage of the maximum possible betweeness).

The Girvan/Borgatti/Cheng/Hanneman method does not explicitly specify summing the percentage of each communication variation and using it to calculate link strength.

A person of ordinary skill in the art, upon reading the prior art, would also have recognized the desirability of improved methods for calculating the link strength and subsequently, centrality. However, since there are a finite number of measurable characteristics relating to link strength and a finite number of predictable results that could occur from manipulating these characteristics, using known mathematical techniques to manipulate the link characteristics to optimize the accuracy and reliability of the link strength calculation technique would be obvious. It would have been obvious

to one of ordinary skill in the art at the time the invention was made to apply measurable characteristics taught in the Girvan/Borgatti/Cheng/Hanneman method in an attempt to provide an improved formulation for calculating the link strength and centrality, as a person with ordinary skill has good reason to pursue the known options within his or her technical grasp. In turn, because the link strength calculation defined by applicant has the properties predicted by the prior art and there are a finite number of predictable results obtained from manipulating the characteristics, i.e. formula manipulation either increases or decreases accuracy and reliability of network simulation, it would have been obvious to make the calculation using the technique defined by applicant.

Regarding claim 5, the Girvan/Borgatti/Cheng/Hanneman method teaches further comprising organizing said link strength values into an adjacency matrix and computing the Eigenvector Centrality index as the principal eigenvector of said adjacency matrix (Borgatti: pg 61, paragraph 3).

Regarding claim 6, the Girvan/Borgatti/Cheng/Hanneman method teaches further comprising assigning the role of border nodes to all nodes that have no unique association to any one centre node (Girvan: pg 7825, Figure 6 depicts subset regions as borders, in particular the Statistical physics group has two subset "border" regions, one between the Statistical Physics group and the Mathematical Ecology Group and represented with light gray squares, and one between the Statistical Physics group and

the Structure of RNA group and represented with dark gray squares. See also Hanneman: pg 82-84 "N-Clans" section).

Regarding claim 7, the Girvan/Borgatti/Cheng/Hanneman method teaches further comprising assigning the role of bridge nodes to all border nodes which lie on at least one link path connecting two centre nodes (Girvan: pg 7825, Figure 6 depicts bridging nodes connecting the center nodes of groupings; See also Hanneman: pg 77, paragraph 3 and pg 90, paragraph 2).

Regarding claim 8, the Girvan/Borgatti/Cheng/Hanneman method teaches further comprising assigning the role of dangler nodes to all border nodes which lie on no link path connecting centre nodes (Girvan: pg 7825, Figure 6 depicts sink nodes in the border groupings; See also Hanneman: pg 128-129, last paragraph beginning with "For a first step..", and pg 40, paragraph 2 and pg 43, paragraph 2 beginning with "We can also look...").

Regarding claim 9, the Girvan/Borgatti/Cheng/Hanneman method teaches further comprising preventing spreading of a virus in the network by identifying which nodes to protect (Hanneman: pg 37, paragraph 3 indicates disease spreading is a concern for the most connected nodes; Borgatti: pg 58, section 2.6 indicates infection as a type of communication variation).

Regarding claim 10-14, these claims do not contain any further limitations than their parent claim, are directed to an intended use that does note recite particular steps, and is therefore rejected under the same rationale as the parent claim, claim 1, where applicable.

Regarding claim 15, the Girvan/Borgatti/Cheng/Hanneman method teaches further comprising selectively identifying nodes for preventing spreading of harmful information in said network (Hanneman: pg 37, paragraph 3 indicates disease spreading is a concern for the high connected nodes).

Cited Pertinent Prior Art

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Hader et al ("Efficient density clustering using basin spanning trees", 2003) discloses a system for clustering points based on steepest ascent trajectory to a single local maximum.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JEFFREY NICKERSON whose telephone number is (571)270-3631. The examiner can normally be reached on M-Th, 8:30-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew Caldwell can be reached on 571-272-3868. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. N./
Jeffrey Nickerson
Examiner, Art Unit 2442

/Andrew Caldwell/
Supervisory Patent Examiner, Art Unit 2442